III Semester B.Sc. Degree Examination, April/May 2023

(NEP)

PHYSICS

Wave Motion and Optics

Time : 2½ Hours   Max. Marks : 60

PART – A

Answer **any four** of the following. **Each** question carries **two** marks.   (4×2=8)

1. What is that moves in wave motion ?

2. What is the difference between the transverse waves and longitudinal waves ?

3. Velocity of sound waves is greater in solids than in liquids. Justify.

4. Soap bubbles appear coloured in sunlight. Why ?

5. Light waves can be polarised but not sound waves. Explain.

6. Is the light from sodium lamp polarised ? Explain.

PART – B

Solve **any four** of the following. **Each** question carries **five** marks.   (4×5=20)

7. The equation of a progressive wave is given by $y = 0.1 \sin(100\pi t - 0.02\pi x)$ where x and y are in 'm' and 't' in seconds. Find amplitude, frequency, wavelength and wave velocity.

8. Two waves $y_1 = 2\sin\omega t$ and $y_2 = 5\sin(\omega t + \frac{\pi}{3})$ superpose in the same direction, where y_1 and y_2 are in 'm' and 't' in seconds. Find the resultant amplitude and phase.

9. A string of linear density 3g/m carries a progressive wave of amplitude 1.8cm, frequency 80 Hz with a speed of 300m/s. Calculate the energy density and the rate of energy propagation in the string.

10. An air wedge is formed between two optical glass plates, when viewed by a light of wavelength 6000Å, 15 fringes are observed in a distance of 4mm. If the length of the wedge is 4cm. Calculate thickness of spacer.

P.T.O.

11. Light of wavelength 500nm is incident normally on a plane transmission grating. A second order spectral line is observed at an angle of 30°. Calculate the number of lines per meter on the grating surface.

12. Calculate the thickness of quarter wave plate and half wave plate if refractive index for ordinary ray is 1.658 and that for extraordinary ray is 1.486. Given wavelength of light 5893Å.

PART – C

Answer **any four** of the following. **Each** question carries **Eight** marks.   (4×8=32)

13. State any three characteristics of wave motion, deduce wave equation in differential form.

14. Obtain an expression for velocity of transverse waves along a stretched string.

15. Derive an expression for velocity of longitudinal waves in a gas.

16. Describe with necessary theory fresnel biprism experiment to find wavelength of light.

17. What are Newton's rings ? Obtain an expression for diameter of nth ring in reflected light system.

18. Give the theory of diffraction due to a straight edge.